AMENDMENTS TO THE SPECIFICATION

On page 1, please delete the subheading "BACKGROUND OF THE INVENTION".

On page 1, please replace the subheading "(1) FIELD OF THE INVENTION" with "FIELD".

On page 1, please replace the subheading "(2) BACKGROUND" with "BACKGROUND".

On page 3, please replace the subheading "SUMMARY OF THE INVENTION" with "SUMMARY".

On page 7, please replace the subheading "DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE INVENTION" with "DETAILED DESCRIPTION OF THE VARIOUS EMBODIMENTS".

Applicant notes the original application was filed without paragraph numbers. To facilitate the incorporation of these amendments, Applicant has numbered the paragraphs. Please replace the following paragraphs rewritten in amendment format:

[0001] ~~This invention~~ The present disclosure pertains to the field of monitoring saturation levels of dissolved solutes in solvent solutions. More particularly, this invention pertains to the use of electrical characteristics of such solutions to determine and monitor saturation levels.

[0006] The present ~~invention~~disclosure eliminates many of the difficulties associated with prior art techniques of determining when a bath of solvent has become saturated or predicting how soon such a bath of solvent will become saturated. In

general, the ~~invention~~disclosure allows for the constant monitoring of the saturation level of resin in solvent baths.

[0007] In one aspect of the ~~invention~~disclosure, a method comprises forming at least a portion of an object by curing resin. This method further comprises the step of providing a storage device containing a liquid. The liquid comprises a solution of solvent and dissolved resin, such that the solution has a ratio of the dissolved resin to solvent. Additionally, the method comprises the step removing an amount of resin from the object via the liquid in a manner such that the amount of resin becomes dissolved in the liquid and thereby increases the ratio of the dissolved resin to the solvent of the liquid. The increase of the ratio alters an electrical characteristic of the liquid. The method yet further comprises the step of utilizing changes in the electrical characteristic of the liquid as an indicator of the ratio of the dissolved resin to the solvent of the liquid.

[0008] In another aspect of the ~~invention~~disclosure, a method comprises forming at least a portion of an object by curing resin. This method also comprises the step of providing a storage device containing a liquid. The liquid comprises solvent and dissolved resin, and has at least one electrical characteristic. Additionally, the method comprises removing an amount of resin from the object via the liquid in a manner such that the amount of resin becomes dissolved in the liquid and thereby alters the electrical characteristic of the liquid. Furthermore, the method comprises removing an amount of the liquid from the storage device and adding solvent to the liquid in the storage device in response to a measurement of the electrical characteristic of the liquid. The solvent added to the liquid in the storage device thereby alters the electrical

[0009] In yet another aspect of the ~~invention~~disclosure, a method comprises the step of providing a storage device containing a liquid. The liquid comprises solvent and solute and has a ratio of the solute to the solvent. This method also includes removing an amount of material from an object via the liquid in a manner such that the amount of material becomes additional solute in the liquid and thereby increases the ratio of the solute to the solvent of the liquid. The increase of the ratio alters an electrical characteristic of the liquid. Additionally, the method comprises the step of utilizing changes in the electrical characteristic of the liquid as an indicator of the ratio of the solute to the solvent of the liquid.

[0010] In yet another aspect of the ~~invention~~disclosure, an assembly comprises a storage device, an amount of liquid stored in the storage device, and a monitoring device. The liquid comprises solvent and dissolved resin. The monitoring device is in communication with the liquid in the storage device and is adapted and configured to pass an electric current through at least some of the liquid and to produce a plurality of signals indicative of a plurality of conditions of conductivity of the liquid in the storage device.

[0011] While the principal advantages and features of the ~~invention~~disclosure have been described above, a more complete and thorough understanding of the ~~invention~~disclosure may be obtained by referring to the drawings and the detailed description of the preferred embodiment, which follow.

[0012] Figure 1 is a perspective view showing a cleaning apparatus having a liquid storage device for removing resin from objects and a monitoring device for practicing the ~~invention~~disclosure.

[0013] Figure 2 is a schematic of the electrical circuitry of the preferred embodiment of a monitoring device for practicing the ~~invention~~disclosure.

[0014] Figure 3 is a flowchart of the preferred method of practicing the ~~invention~~disclosure.

[0016] In general, the present ~~invention~~disclosure involves the monitoring of at least one electrical characteristic of a solvent used to dissolve and remove undesirable resin from objects. An ~~preferred~~ embodiment of a cleaning apparatus for practicing the ~~invention~~disclosure is shown in Figure 1. This cleaning apparatus, generally indicated by reference numeral 20, is particularly adapted for the removal of resin from prototype objects during a process of forming such objects via a stereolithography process. The cleaning apparatus 20 generally comprises a liquid storage device 22 containing a bath of solvent 24, and a monitoring device 26.

[0023] A flowchart of ~~the preferred~~an operation of the cleaning apparatus in connection with the monitoring device is shown in Figure 3. As resin is removed from objects placed in the liquid storage device, the monitoring device continuously monitors the bath of solvent as described above. Preferably, the variable resistor that is connected in series with a first one of the LEDs is adjusted so that this first LED illuminates even when the solvent bath contains no resin. In other words, the first LED illuminates under all impedance conditions of the bath of solvent. This is done so as to verify to the person using the cleaning apparatus that the monitoring device is functioning. Additionally, the variable resistor that is connected in series with a second

one of the LEDs is preferably adjusted such that the second LED illuminates when the resin-to-solvent concentration is above particular value determined to be when the bath of solvent is reaching the end of its usefulness, but prior to when the bath of solvent is needed to be replaced. Furthermore, the variable resistor that is connected in series to yet a third one of the LEDs is preferably adjusted such that this third LED will illuminate only when the impedance of the bath of solvent drops below a value indicative of the need to replace the bath of solvent with fresh solvent. If so desired, additional LEDs can be configured to illuminate when the impedance of the bath of solvent drops below any other impedance set-point. These set-points are preferably determined by ~~trail~~trial and error, or by adjusting a resistor to illuminate an LED when the bath of solvent is known to be at the relevant resin-to-solvent concentration level.

[0024] In view of the foregoing, it should be appreciated that, as the resin-to-solvent concentration increases, the number of illuminated LED's increases. Thus, an operator using the cleaning apparatus is continually informed of the condition of the bath of solvent. Moreover, the illumination of an LED, such the second LED described above, can serve the purpose of notifying an operator of the cleaning apparatus that the bath of solvent, while still being effective in removing resin, will soon need replacing. Thus, upon the illumination of such an LED, the operator can take steps to ensure that a sufficient stock of solvent will be on hand when the bath of solvent reaches the end of its useful life. The illumination of yet other LEDs can serve as an indication that the resin-to-solvent concentration is sufficiently high to warrant increasing the cleaning time of objects. Hence, practicing the present ~~invention~~disclosure allows for, among other things, more efficient scheduling of solution

changes, more efficient stocking of solvent, and more efficient overall productivity of the cleaning apparatus.

[0025] While the present ~~invention~~disclosure has been described in reference to ~~a specific~~various embodiments, in light of the foregoing, it should be understood that all matter contained in the above description or shown in the accompanying drawings is intended to be interpreted as illustrative and not in a limiting sense and that various modifications and variations of the ~~invention~~disclosure may be constructed without departing from the scope of the ~~invention~~disclosure defined by the following claims. For example, it should be appreciated that monitoring devices could be configured to only periodically monitor the bath of solvent or to do so only upon a request signal initiated by the operator. Furthermore, in lieu of LEDs, monitoring devices could be configured to use acoustic signals, text messages, or any other method of conveying the status of the bath of solvent. Additionally, the circuitry of the monitoring device need not necessarily be similar to the monitoring device of the preferred embodiment. For example, a monitoring device could have fewer components, such as only a single pair of space probes, or could have additional components, such as Zener diodes to protect the LEDs. Still further, although the ~~invention~~disclosure is described as being used in connection with stereolithography, it should be appreciated that it could also being utilized in connection with other rapid prototyping processes or with any process utilizing solvents. Thus, other possible variations and modifications should be appreciated.

[0026] Furthermore, it should be understood that when introducing elements of the present ~~invention~~disclosure in the claims or in the above description of the ~~preferred~~ embodiments of the ~~invention~~disclosure, the terms "comprising," "including,"

and "having" are intended to be open-ended and mean that there may be additional elements other than the listed elements. Similarly, the term "portion" should be construed as meaning some or all of the item or element that it qualifies.